

Smart Materials as Intelligent Insulation

A. F. Holt^{*1}, R. C. D. Brown¹, P. L. Lewin¹, A. S. Vaughan¹ and P. Lang²

¹University of Southampton

²EDF Energy Networks Ltd, Crawley, UK

*E-mail: afh09r@ecs.soton.ac.uk

In order to provide a robust infrastructure for the transmission and distribution of electrical power, understanding and monitoring equipment ageing and failure is of paramount importance. Commonly, failure is associated with degradation of the dielectric material; therefore the introduction of a smart moiety into the material is a potentially attractive means of continual condition monitoring.

It is important that any introduction of smart groups into the dielectric does not have any detrimental effect on the desirable electrical and mechanical properties of the bulk material. Initial work focussed on the introduction of fluorophores into a model dielectric system. Fluorescence is known to be a visible effect even at very low concentrations of active fluorophores and therefore was thought well suited to such an application. It was necessary both to optimise the active fluorophore itself and to determine the most appropriate manner in which to introduce the fluorophores into the insulating system.

This presentation will describe the effect of introducing fluorophores into polymeric systems on the dielectric properties of the material and the findings thus far [1]. Alternative smart material systems will also be discussed along with the benefits and limitations of smart materials as electric field sensors.

[1] A. F. Holt, A. C. Topley, R. C. D. Brown, P. L. Lewin, A. S. Vaughan and P. Lang, "Towards Intelligent Insulation Technologies", *ICSD conference, Potsdam 2010*.